

# PSR-...-120UC/ESAM4/3X1/1X2/B

## Safety relay for emergency stop and safety door monitoring

Data sheet  
105316\_en\_02

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### 1 Description

The safety relay can be used in safety circuits according to EN 60240-1 and IEC 61508.

With this switching device, circuits are interrupted in a safety-oriented manner.

Control is via a single channel or two channels, either with automatic or manual start circuit.

Depending on the external wiring, up to category 4, PL e according to EN ISO 13849-1 or SILCL 3 according to EN 62061 can be achieved.

The safety relay is equipped with three enabling current paths that drop out without delay corresponding to stop category 0 according to EN 60204-1.

### Features

- Emergency stop and safety door monitoring
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)
- Optional plug-in screw or spring-cage terminal blocks
- Single-channel or two-channel wiring with cross-circuit detection
- 3 enable current paths
- 1 signaling current path



#### **WARNING: Risk of electric shock**

Observe the safety instructions in the corresponding section!



Make sure you always use the latest documentation.  
It can be downloaded from the product at [phoenixcontact.net/products](http://phoenixcontact.net/products).



This data sheet is valid for all products listed on the following pages.

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### 3 Ordering data

| Description  | Type                           | Order No. | Pcs. / Pkt. |
|--|--------------------------------|-----------|-------------|
| Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, single or two-channel operation, 3 enabling current paths, nominal input voltage of 120 V AC/DC, plug-in screw terminal blocks       | PSR-SCP-120UC/ESAM4/3X1/1X2/B  | 2901422   | 1           |
| Safety relay for emergency stop and safety door monitoring up to SIL 3 or Cat. 4, PL e according to EN ISO 13849, single or two-channel operation, 3 enabling current paths, nominal input voltage of 120 V AC/DC, plug-in spring-cage terminal blocks | PSR-SPP-120UC/ESAM4/3X1/1X2/B  | 2901425   | 1           |
| Documentation  | Type                           | Order No. | Pcs. / Pkt. |
| User manual, English, for applications for PSR safety relay  | UM EN SAFETY RELAY APPLICATION | 2888712   | 1           |

### 4 Technical data

| Input data  |   |
|---|---|
| Input voltage range   | 110 V AC/DC ... 120 V AC/DC   |
| Input voltage range (factor)  | 0.85 ... 1.1  |
| Typical input current   | 38 mA   |
| Voltage at input/start and feedback circuit                                       | ~ 24 V DC   |
| Max. permissible overall conductor resistance (Input and reset circuit at $U_N$ ) | 50 $\Omega$   |
| Typical response time   | 40 ms (man. start)  |
| Typical release time  | 60 ms (when controlled via A1)  |
| Recovery time   | 1 s   |
| Operating voltage display   | Green LED   |
| Status display  | Green LED   |
| Protective circuit  | Surge protection Suppressor diode   |
| Output data   |   |
| Contact type  | 3 enabling current paths<br>1 signaling current path  |
| Contact material  | AgSnO <sub>2</sub> , + 0.2 $\mu$ m Au   |
| Minimum switching voltage   | 10 V AC/DC  |
| Maximum switching voltage   | 250 V AC/DC   |
| Limiting continuous current   | 6 A (N/O contact)   |
| Maximum inrush current  | 6 A   |
| Inrush current, minimum   | 10 mA   |
| Sq. Total current   | $72 \text{ A}^2$ ( $I_{TH}^2 = I_1^2 + I_2^2 + I_3^2$ )<br>(see derating curve)   |
| Interrupting rating (ohmic load) max.   | 144 W (24 V DC, $\tau = 0$ ms)<br>230 W (48 V DC, $\tau = 0$ ms)<br>68 W (110 V DC, $\tau = 0$ ms)<br>88 W (220 V DC, $\tau = 0$ ms)<br>2000 VA (250 V AC, $\tau = 0$ ms) |
| Maximum interrupting rating (inductive load)                                      | 48 W (24 V DC, $\tau = 40$ ms)<br>40 W (48 V DC, $\tau = 40$ ms)<br>35 W (110 V DC, $\tau = 40$ ms)<br>33 W (220 V DC, $\tau = 40$ ms)                                    |
| Switching capacity min.   | 100 mW  |
| Mechanical service life   | Approx. $10^7$ cycles   |

**Output data**

|                                    |   |
|------------------------------------|---|
| Switching capacity (360/h cycles)  | 6 A (24 V DC)<br>5 A (230 V AC)                                   |
| Switching capacity (3600/h cycles) | 3 A (24 V (DC13))<br>3 A (230 V (AC 15))                          |
| Output fuse                        | 10 A gL/gG NEOZED (N/O contact)<br>6 A gL/gG NEOZED (N/C contact) |

**General data**

|   |  |
|---|--|
| Relay type  | Electromechanically forcibly guided, dust-proof relay.   |
| Nominal operating mode                                | 100% operating factor  |
| Degree of protection                                  | IP20   |
| Min. degree of protection of inst. location           | IP54   |
| Mounting position                                     | any  |
| Air and creepage distances between the power circuits | DIN EN 50178/VDE 0160  |
| Rated surge voltage / insulation                      | 4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between A1-A2/logic/enabling and signaling current paths) |

**Dimensions**

W x H x D

**Screw connection**

22.5 x 99 x 114.5 mm

**Spring-cage connection**

22.5 x 112 x 114.5 mm

**Connection data**

Conductor cross section, solid

0.2 mm<sup>2</sup> ... 2.5 mm<sup>2</sup>0.2 mm<sup>2</sup> ... 1.5 mm<sup>2</sup>

Conductor cross section, stranded

0.2 mm<sup>2</sup> ... 2.5 mm<sup>2</sup>0.2 mm<sup>2</sup> ... 1.5 mm<sup>2</sup>

Conductor cross section AWG/kcmil

24 ... 12

24 ... 16

**Ambient conditions**

|  |                  |
|--|------------------|
| Ambient temperature (operation)                | -25 °C ... 55 °C |
| Ambient temperature (storage/transport)        | -40 °C ... 85 °C |
| Max. permissible relative humidity (operation) | 75 %             |
| Max. permissible humidity (storage/transport)  | 75 %             |

**Certification / Approvals**

Approvals

**Safety data**

|                                      |   |
|--------------------------------------|---|
| Stop category according to IEC 60204 | 0 |
|--------------------------------------|---|

**Safety parameters for IEC 61508 - High demand**

|                     |             |
|---------------------|-------------|
| SIL                 | 3           |
| Demand rate         | < 12 Months |
| Proof test interval | 240 Months  |

**Safety parameters for IEC 61508 - Low demand**

|                     |            |
|---------------------|------------|
| SIL                 | 3          |
| Proof test interval | 78 Months  |
| Duration of use     | 240 Months |

**Safety characteristic data according to EN ISO 13849**

|                   |   |
|-------------------|---|
| Category          | 4 |
| Performance level | e |

## 5 Basic circuit diagram

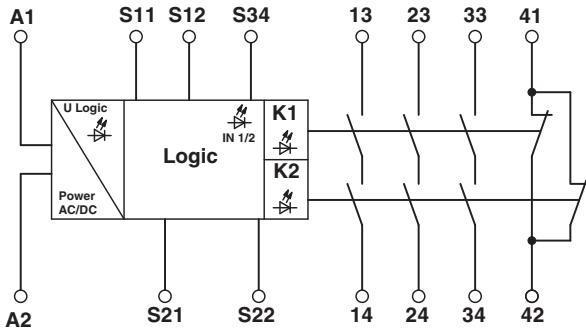


Figure 1 Block diagram

Key:

| Designation | Explanation                          |
|-------------|--------------------------------------|
| A1/A2       | Safety relay input voltage           |
| S11/S12     | Safety sensor/switch 1 input circuit |
| S21/S22     | Safety sensor/switch 2 input circuit |
| S34         | Start circuit                        |
| 13/14       | Undelayed enabling current path 1    |
| 23/24       | Undelayed enabling current path 2    |
| 33/34       | Undelayed enabling current path 3    |
| 41/42       | Signaling current path               |

## 6 Derating

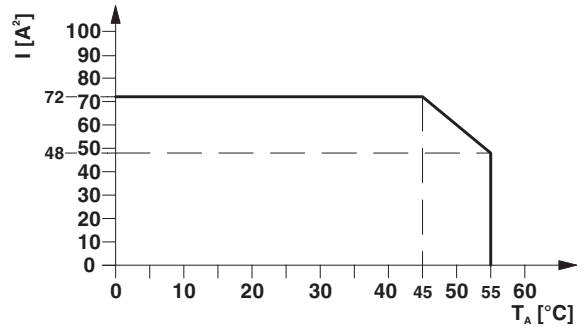


Figure 2 Derating curve

## 7 Safety notes



### **WARNING: Risk of electric shock**

During operation, parts of electrical switching devices carry hazardous voltages.

Before working on the switching device, disconnect the power.

Please observe the safety regulations of electrical engineering and industrial safety and liability associations!

Disregarding these safety regulations may result in death, serious personal injury or damage to equipment.

Startup, mounting, modifications, and upgrades should only be carried out by a skilled electrical engineer!



### **WARNING: Risk of automatic machine restart!**

For emergency stop applications, the machine must be prevented from restarting automatically by a higher-level control system.

Protective covers must not be removed when operating electrical switching devices.



### **WARNING: Risk of automatic machine restart!**

When using the manual reset function with monitored start, the "cross-circuit between S21/S22 and the cable from the reset button to S34" error must be prevented by design-related measures, especially for safety functions with increased risk potential (see EN ISO 13849-2).



### **WARNING: Danger due to faulty devices!**

The devices may be damaged following an error and correct operation can no longer be ensured.

In the event of an error, replace the device immediately.

Repairs to the device, especially if the housing must be opened, may only be carried out by the manufacturer or authorized persons. Otherwise the warranty is invalidated.



### **NOTE: Risk of damage to equipment due to incorrect installation**

For reliable operation, the safety relay must be installed in housing protected from dust and humidity (IP54).

Carry out wiring according to the application. Refer to the "Application examples" section for this.



### **NOTE: Risk of damage to equipment due to noise emissions**

When operating relay modules the operator must meet the requirements for noise emission for electrical and electronic equipment (EN 61000-6-4) on the contact side and, if required, take appropriate measures.

## 8 Operating and indication elements

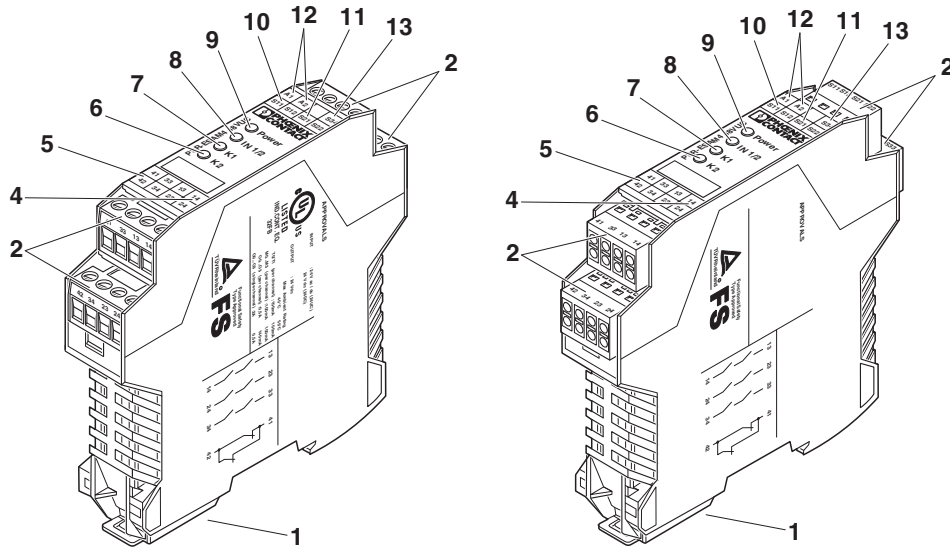


Figure 3 PSR-SCP-120UC/ESAM4/3X1/1X2/B and PSR-SPP-120UC/ESAM4/3X1/1X2/B

### Key:

| Designation | Explanation                                  |
|-------------|--|
| 1           | Metal lock for mounting on the DIN rail      |
| 2           | COMBICON plug-in screw terminal blocks       |
| 3           | COMBICON plug-in spring-cage terminal blocks |
| 4           | 13/14, 23/24, 33/34 - enabling current paths |
| 5           | 41/42 signaling current path                 |
| 6           | LED status indicator, green - K1             |
| 7           | LED status indicator, green - K2             |
| 8           | LED status indicator, green - IN 1/2         |
| 9           | LED status indicator, green - Power          |
| 10          | S11/S12 - input circuit                      |
| 11          | S21/S22 - input circuit                      |
| 12          | Power supply                                 |
| 13          | S34 - start circuit                          |

## 9 Diagnostics

The diagnostic descriptions can be found in Section 7 of the application manual for PSR safety relays.

## 10 Application examples

### 10.1 Two-channel emergency stop circuit with cross-circuit detection

- Manual activation with connection at S12-S34
- Suitable up to category 4, PL e (EN ISO 13849-1), SILCL 3 (EN 62061)

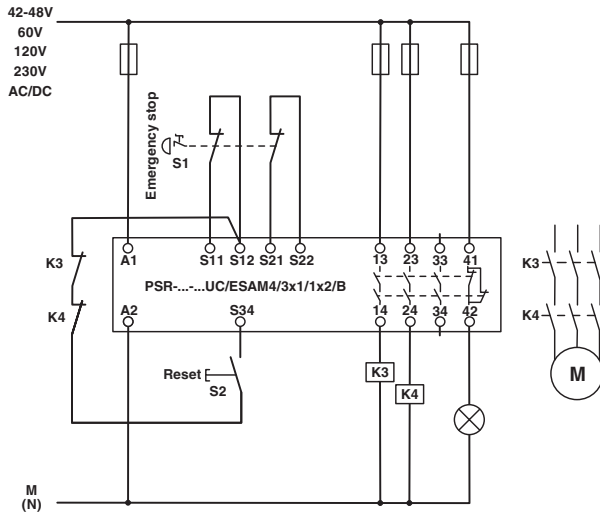


Figure 4 Emergency stop with cross-circuit detection and manually monitored reset

### 10.2 Single-channel emergency stop circuit

- Automatic activation with connection at S22-S34
- Suitable up to category 1, PL c (EN ISO 13849-1), SIL-CL 1 (EN 62061)

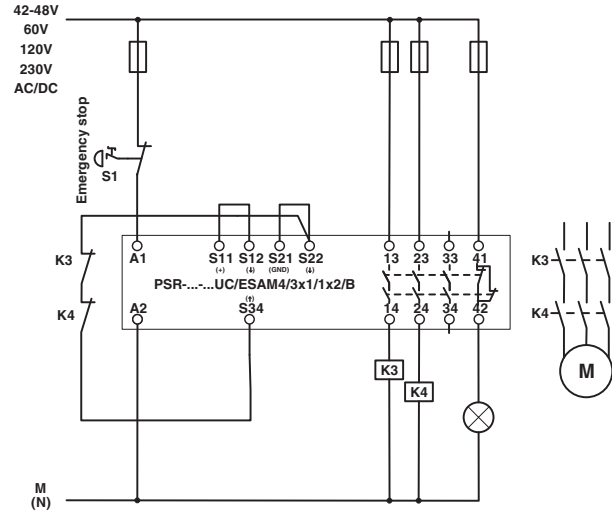


Figure 5 Emergency stop with automatic start



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